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**(54) Frozen uncooked meat products**

**(57) A composition for use in coating uncooked shaped meat products such as sausages or hamburgers, prior to freezing, comprises a soluble inert carbohydrate of low dextrose equivalent e.g. a malto-dextrin; a starchy material and a sugar. The starchy material may comprise pre-gelatinised potato starch or heat treated wheat flour and may be partially replaced by a hydrocolloid. Other components are mentioned.**

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IMPROVEMENTS IN OR RELATING TO FROZEN UNCOOKED

MEAT PRODUCTS

In cooking, for example, frozen shaped meat products such as comminuted meat products e.g. sausages and burgers, or fillets such as chicken breasts and beef steaks in micro-wave ovens, a problem arises in that the product fails to brown on the surface in the manner obtaining when grilled by radiant heating; and it will be realised in this regard that the surface temperature of the product in the micro-wave oven does not exceed e.g. about 100°C whereas in a radiant oven surface temperatures up to e.g. about 200°C obtain. Similar problems arise with other penetrating short exposure time, low product surface temperature ovens, for example an in-line multi-purpose oven as described in U.S. Patents Nos. 3,947,241 and 4,167,585 of Heat and Control Inc.

It is an object of the present invention to provide a composition adapted for use in coating an uncooked shaped meat product prior to freezing so that the product browns under short exposure time, low product surface temperature cooking conditions.

Another problem with short exposure low surface temperature cooking is that the Maillard reactions which provide cooked, burnt grilled notes in e.g. grilling or

frying do not occur and the cooked products may seem bland, shallow or even unpleasant.

The invention provides a composition adapted for use in coating an uncooked shaped meat product prior to freezing and comprising a soluble inert carbohydrate of low dextrose equivalent e.g. a malto-dextrin; a starchy material; and a sugar.

The invention also provides a composition adapted for use in coating an uncooked shaped meat product prior to freezing and comprising a malto-dextrin; a modified starch product; a sugar; colouring and optionally flavour.

The invention also comprehends a frozen uncooked shaped meat product e.g. a sausage or burger coated with a composition according to the invention; and a cooked product obtained by short exposure time, low product surface temperature cooking of such a frozen product.

The invention further comprehends a method of preparing an uncooked shaped meat product utilising a composition according to the invention.

The malto-dextrin may have for example a dextrose equivalent not exceeding 18 DE units e.g. 15-18 DE units.

Dextrose equivalent is a measure of reducing sugar content calculated as dextrose and as a percentage of dry substance weight. The dextrose equivalent of malto-

dextrins generally does not exceed 20 DE units.

Examples of suitable meats include beef, pork, poultry and lamb. A shaped comminuted product may be cased as with many sausages or uncased as with burgers.

A composition according to the invention comprises for example (dry basis):

- 25 - 65% by weight malto-dextrin,
- 20 - 50% by weight modified starch product,
- 10 - 25% by weight of the sugar,
- 2 - 20% by weight colouring and flavour.

The modified starch product may be partially replaced by a hydrocolloid.

The colouring may include for example (dry basis) 2-5% by weight of the total composition of malt extract.

When used for coating a sausage, a composition according to the invention comprises for example (dry basis):

- 50 - 65% by weight malto-dextrin;
- 20 - 30% by weight modified starch product.

The colouring may include, for example 1-3.5% by weight of the total composition of encapsulated paprika oleo-resin.

A similar composition may be used for chicken breasts but omitting the flavour.

When used for coating a burger, a composition

according to the invention comprises for example (dry basis):

25 - 40% by weight malto-dextrin,

40 - 50% by weight modified starch product.

Examples of sugars include for example dextrose, sucrose and fructose.

The modified starch product comprises for example a modified cereal flour e.g. a physically modified wheat flour; or alternatively for example a pre-gelatinised starch derived from native, chemically, physically and/or enzymically modified starches of maize, waxy maize, tapioca, wheat, cassava or potato.

Pre-gelatinised potato starch may be preferred for sausage coatings on account of its adhesive qualities, and heat treated wheat flour for burgers.

A composition embodying the invention may be manufactured by dry blending of the ingredients and is provided in the form of a dusting powder of an overall neutral beige colour which is well camouflaged on the surface of the meat product; the particle size of the dusting powder is for example such as to pass through a 250 micron mesh (BS 60). 1% by weight of groundnut oil may be incorporated in the powdered ingredients to dampen the generation of air borne dust during manufacture.

In the preparation of a frozen sausage or burger, the uncooked sausage or burger is coated at a temperature of e.g.  $-5^{\circ}\text{C}$  -  $+5^{\circ}\text{C}$  with the dusting powder the powder is allowed to take up moisture from the product for a period of for example at least 30 seconds and the product is then immediately deep frozen; if desired the natural uptake of moisture from the product can be artificially supplemented by for example passing the product through an aqueous mist.

On thawing and cooking the frozen product in a micro-wave oven (without pre-thawing) the surface of the product browns to an appetising more or less glossy appearance.

It is believed the combination of malto-dextrin, starchy material and sugar contribute to the glossy appearance of the product; and the malt-extract provides colouring as does the encapsulated paprika oleo-resin, which has a natural red colour changing to an appetising reddish/brown on cooking under micro-wave conditions.

In the case of a composition for coating a sausage the starchy material-malto-dextrin ratio does not exceed for example 0.6, e.g. 0.3 - 0.5, which apparently provides for maximum adhesion and high gloss.

In the case of a composition for coating a

burger, the starchy material-malto-dextrin ratio is for example at least 1.0 e.g. 1.2 - 2.0; the higher starch content serving to reduce the gloss as compared with the sausage coating composition.

Examples of flavours include enzyme modified pork rinds, and various other pork, beef, turkey and lamb flavours e.g. the following Mastertaste flavours of Lucas Ingredients Limited, England:-

<u>Beef:</u>	LA710	- a dry mix of flavour ingredients including Maillard reaction bases
	LA711	- a spray dried Maillard reaction base
	LA714	- a dry mix of flavour ingredients including Maillard reaction bases
<u>Pork Rind:</u>	LA712	- spray dried naturally hydrolysed pork rind
<u>Pork:</u>	LA713	- a dry mix of flavour ingredients including Maillard reaction bases
<u>Natural Pork:</u>	LA715	- naturally hydrolysed pork and natural monosodium glutamate flavour
<u>Pork:</u>	LA717	- a dry mix of flavour ingredients including Maillard reaction bases
<u>Turkey:</u>	LA716	- a dry mix of turkey extract, spices and hydrolysed vegetable protein
<u>Lamb:</u>	LA718	- a dry mix of lamb extract and Maillard reaction bases.

The quantity of flavour in the 2-20% by weight colouring and flavour is for example 0.5-8% by weight of

the total composition in the case of compositions for burgers and 0.2-1% by weight of the total composition in the case of compositions for sausages.

Examples of suitable colourings include as well as malt extract and encapsulated paprika oleo-resin; other colours of a natural appearance such as caramel and various melanoidins.

EXAMPLE 1

Sausage Dusting Powder

	<u>Parts by Weight</u>
Maldex 15 (malto-dextrin DE 15 - Tunnel Avebe, England)	52.7
Preflo P250 (pre-gelatinised potato starch - Roquette U.K. Limited, England)	26.0
Dextrose monohydrate	16.0
Superbrown (malt extract - Lucas Ingredients Limited)	3.0
Flavourseal stable paprika (encapsulated paprika oleo-resin - Lucas Ingredients Limited)	1.0
Groundnut oil	1.0
Mastertaste spray dried enzyme modified pork rind LA712	<u>0.3</u>
	100.0

A 50 gram uncooked pork catering sausage having a 50% meat content was coated with the dusting powder and excess removed to leave an even layer. About 45 seconds was allowed for uptake of moisture and the sausage was then



individually blast frozen to an internal temperature of -18°C by the forced convection of refrigerated air.

The frozen sausage was both thawed and cooked to an internal temperature of about 80°C in a 450 watt Siemens Micro-wave Plus oven on "defrost" setting for one minute followed by the "cook" setting for one minute.

The cooked sausage had an appetising glossy brown appearance resembling that of a grilled sausage; and a tasty cooked pork flavour.

EXAMPLE 2

Sausage Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	52.7
Preflo P250	25.0
Dextrose monohydrate	15.0
Superbrown	5.0
Flavourseal stable paprika	2.0
Mastertaste LA712	<u>0.3</u>
	100.0

The procedure of Example 1 was substantially followed with a 65% meat content pork sausage, but the cooking was in a 650 watt Philips Cooktronic M710 micro-wave oven on "defrost" for one minute and on the high setting No. 10 for one minute.

The cooked sausage had a darker hue than that of Example 1 but similar in terms of sheen and grilled flavour.

EXAMPLE 3

Sausage Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	53.7
Preflo P250	26.0
Dextrose monohydrate	15.0
Superbrown	3.0
Flavourseal stable paprika	2.0
Mastertaste LA712	<u>0.3</u>
	100.0

The procedure of Example 1 was substantially followed, but the cooking was in a 1300 watt Sharp commercial micro-wave oven on 100% power for 30 seconds.

The cooked sausage had a grilled appearance excellent for commercial catering purposes.

EXAMPLE 4

Sausage Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	53.5
Preflo P250	26.0
Dextrose monohydrate	16.0
Superbrown	2.0
Flavourseal stable paprika	1.0
Groundnut oil	1.0
Mastertaste turkey flavour LA716	<u>0.5</u>
	100.0

The procedure of Example 1 was substantially followed with a 65% meat content turkey sausage, and the cooked sausage had an attractive grilled appearance and enhanced grilled turkey flavour.

EXAMPLE 5

Beefburger or Steakette Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	30.5
Preflo P250	46.0
Dextrose monohydrate	16.0
Superbrown	3.0
Mastertaste beef flavour LA711	<u>4.5</u>
	100.0

A 60 gram uncooked burger having a 100% meat content was coated with the dusting powder and excess removed to leave an even layer. About one minute was allowed for uptake of moisture, and the burger was then individually blast frozen to an internal temperature of about -18°C.

The frozen burger was cooked in the Philips Cooktronic M710 oven on high setting No. 10 for two minutes.

The cooked beefburger had an appetising glossy brown appearance and a tasty grilled beef flavour.

EXAMPLE 6

Beefburger Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	26.0
Preflo P250	45.0
Dextrose monohydrate	15.0
Superbrown	5.0
Flavourseal stable paprika	2.0
Mastertaste beef flavour LA711	<u>7.0</u>
	100.0

The procedure of Example 5 was substantially followed, but the cooking was carried out in the Siemens Microwave Plus oven on the "cook" setting for two minutes.

The cooked burger had a deeper brown colour than that of Example 5, a red hue and a beefier flavour, but was similar in gloss and texture.

EXAMPLE 7

Beefburger Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	26.5
Preflo P250	50.0
Dextrose monohydrate	16.0
Superbrown	3.0
Mastertaste beef flavour LA711	<u>4.5</u>
	100.0

The procedure of Example 5 was substantially followed, but the cooking was carried out in the Philips Cooktronic oven on the setting No. 8 for two and a half minutes.

The cooked burger had an appetising brown appearance but was less glossy than those of Examples 5 and 6.

EXAMPLE 8

Beefburger Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	33.0
Preflo P250	44.5
Dextrose monohydrate	15.0
Superbrown	3.0
Mastertaste beef flavour LA711	<u>4.5</u>
	100.0

The procedure of Example 5 was substantially followed, but the cooking was carried out in the 1300 watt Sharp commercial micro-wave oven at 80% power for 45 seconds.

The cooked burger had an appetising glossy brown appearance and beefy texture, excellent for commercial catering purposes.

EXAMPLE 9

Beefburger Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	31.5
Ambassador flour (heat treated wheat flour - Spillers Milling Limited, England)	46.0
Dextrose monohydrate	16.0
Superbrown	2.0
Mastertaste beef flavour LA711	<u>4.5</u>
	100.0

The procedure of Example 5 was substantially followed with an 80% meat content burger, and the cooked burger again had an appetising glossy brown appearance and a grilled beef flavour, but less glossy than Example 5 and a lighter hue.

EXAMPLE 10

Lamburger Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	31.5
Ambassador flour	46.0
Dextrose monohydrate	16.0
Superbrown	2.0
Mastertaste lamb flavour LA718	<u>4.5</u>
	100.0

The procedure of Example 9 was substantially followed with an 80% meat content lamburger and with a

cooking time of 2½ minutes.

The cooked burger had an appetising brown appearance and a grilled lamb flavour.

EXAMPLE 11

Poultry Dusting Powder

	<u>Parts by Weight</u>
Maldex 15	54.0
Preflo P250	26.0
Dextrose monohydrate	16.0
Superbrown	3.0
Flavourseal stable paprika	<u>1.0</u>
	100.0

Chicken goujons were coated with the dusting powder and excess removed to leave an even layer. After time allowed for uptake of moisture the goujons were frozen.

The frozen goujons were both thawed and cooked in an in-line multipurpose oven as referred to hereinbefore, with a cook time of 90 seconds.

The cooked goujons had an appetising golden brown colour.



CLAIMS:

1. A composition adapted for use in coating an uncooked shaped meat product prior to freezing and comprising a soluble inert carbohydrate of low dextrose equivalent e.g. a malto-dextrin; a starchy material; and a sugar.

2. A composition adapted for use in coating an uncooked shaped meat product prior to freezing and comprising a malto-dextrin; a modified starch product; a sugar; colouring and, optionally flavour.

3. A composition according to claim 2, comprising (dry basis) 25-65% by weight malto-dextrin, 20-50% by weight starchy material, and 10-25% by weight of the sugar.

4. A composition according to claim 3, wherein the starchy material is partially replaced by a hydrocolloid.

5. A composition according to claim 3 or claim 4, comprising (dry basis) 2-20% by weight colouring and flavour.

6. A composition according to any one of the preceding claims comprising malt extract.

7. A composition according to any one of claims 1 to 5, wherein the colouring includes (dry basis) 2-5% by weight of the total composition of malt extract.

8. A composition according to any one of claims

2 to 7, wherein the malto-dextrin has a dextrose equivalent not exceeding 18 DE Units.

9. A composition according to claim 8, wherein the malto-dextrin has a dextrose equivalent of 15-18 DE Units.

10. A composition according to any one of the preceding claims adapted for use in coating a sausage and comprising (dry basis) 50-65% by weight malto-dextrin, and 20-30% by weight starchy material.

11. A composition according to claim 10, having a starchy material-malto-dextrin ratio not exceeding 0.6.

12. A composition according to any one of the preceding claims adapted for use in coating a sausage and comprising encapsulated paprika oleo-resin.

13. A composition according to any one of claims 1 to 11, wherein the colouring comprises (dry basis) 1-3.5% by weight of the total composition of encapsulated paprika oleo-resin.

14. A composition according to any one of claims 1 to 9 adapted for use in coating a burger and comprising (dry basis) 25-40% by weight malto-dextrin and 40-50% by weight starchy material.

15. A composition according to claim 14 having a starchy material-malto-dextrin ratio of at least 1.0.

16. A composition according to any one of the preceding claims wherein the sugar is dextrose.

17. A composition according to any one of the preceding claims wherein the starchy material comprises pre-gelatinised potato starch or heat treated wheat flour.

18. A composition according to any one of claims 1 to 16, wherein the starchy material comprises a pre-gelatinised starch derived from native, chemically, physically or enzymically modified starches of maize, waxy maize, tapioca, wheat, cassava or potato.

19. A composition according to any one of the preceding claims, which is of an overall neutral colour, which browns under short exposure time, low product surface temperature cooking conditions, when coated on to a frozen shaped meat product.

20. A composition according to any one of the preceding claims in the form of a dusting powder.

21. A composition according to claim 20, wherein the particle size of the dusting powder is such as to pass through a 250 micron mesh.

22. A composition adapted for use in coating an uncooked shaped meat product and substantially as hereinbefore described with reference to any of the Examples.

23. A frozen uncooked shaped meat product

containing for example beef, pork, poultry or lamb and coated with a composition according to any one of the preceding claims.

24. A frozen sausage or burger coated with a composition according to claim 1 or claim 2.

25. A cooked meat product obtained by both thawing and cooking of a frozen product according to claim 23 or claim 24 in a short exposure time, low product surface temperature oven.

26. A method of preparing an uncooked shaped meat product containing for example beef, pork, poultry or lamb, comprising the steps of coating the product with a composition according to any one of claims 1 to 22 and freezing the product.

27. A method of preparing an uncooked shaped meat product containing for example beef, pork, poultry or lamb, comprising the steps of dusting the product with a composition according to claim 20 or claim 21, allowing the composition to take up moisture from the product, and freezing the product.

28. A method according to claim 27, wherein the composition is allowed to take up moisture from the product for a period of at least 30 seconds.

29. A method of preparing a sausage or burger substantially as hereinbefore described with reference

to any one of the Examples.